

**What Is Claimed Is:**

1. A method of communicating multiple hazardous condition alarms between distributed hazardous condition detectors over a single signal line, comprising the steps of:

sensing a first hazardous condition; and

generating an alarm signal on the single signal line, the alarm signal comprising at least one voltage pulse having a duration less than 100 milliseconds.

2. The method of claim 1, wherein said step of generating an alarm signal comprises the step of generating a plurality of voltage pulses to form a multi-bit alarm signal.

3. The method of claim 2, wherein the multi-bit alarm signal is an eight-bit alarm signal.

4. The method of claim 3, wherein an upper nibble of the eight-bit alarm signal contains a start pattern, and wherein a lower nibble of the eight-bit alarm signal contains alarm and control information.

5. The method of claim 2, wherein the step of generating a plurality of voltage pulses comprises the step of generating a plurality of voltage pulses of a duration between approximately 25 to 50 milliseconds every 100 milliseconds to form the multi-bit alarm signal.

6. The method of claim 1, wherein the step of generating an alarm signal comprises the step of generating an alarm signal having a duration between approximately 25 to 50 milliseconds.

7. The method of claim 1, wherein the step of generating an alarm signal comprises the step of generating an alarm signal comprising a plurality of voltage pulses at a frequency of approximately 10 hertz.

8. The method of claim 2, wherein the step of generating the multi-bit alarm signal is repeated periodically during the first sensed hazardous condition.

9. The method of claim 2, wherein the step of generating the multi-bit alarm signal comprising the step of generating a first multi-bit pattern indicating the start of the first hazardous condition.

10. The method of claim 9, wherein the step of generating the multi-bit alarm signal comprising the step of generating a second multi-bit pattern indicating the end of the first hazardous condition.

11. The method of claim 1, further comprising the steps of:  
sensing a smoke condition; and  
generating a smoke alarm signal on the single signal line, the smoke alarm signal comprising a DC voltage signal having a duration longer than 100 milliseconds.

12. A hazardous condition detector, comprising:  
an alarm circuit;  
an interconnection I/O circuit; and  
a microcontroller coupled to the alarm circuit and the interconnection I/O circuit, the microcontroller determining a first alarm condition upon receipt of a pulsed input from the interconnection I/O circuit of less than

approximately 100 milliseconds, and a second alarm condition upon receipt of a DC signal, said microcontroller commanding the alarm circuit to generate a first alarm type upon determining the first alarm condition, and to generate a second alarm type upon determining the second alarm condition.

13. The detector of claim 12, wherein the microcontroller determines a pattern from the pulsed input forming a multi-bit alarm message in accordance with a communications protocol, the microprocessor determining an appropriate alarm pattern for the first alarm condition from the pattern.

14. The detector of claim 12, wherein the microcontroller determines a pattern from the pulsed input forming a multi-bit alarm message in accordance with a communications protocol, the microprocessor determining an operating mode from the pattern.

15. The detector of claim 12, further comprising a first hazardous condition detector circuit coupled to the microcontroller; and  
wherein the microcontroller determines the presence of a first hazardous condition based on input from the hazardous condition detector circuit, the microcontroller generating a second multi-bit alarm message in accordance with the communications protocol to alert external devices of the first hazardous condition, the microcontroller commanding the interconnection I/O circuit to generate a pulsed output to transmit the second multi-bit alarm message.

16. The detector of claim 15, wherein the second multi-bit alarm message is an eight-bit alarm message.

17. The detector of claim 15, wherein the interconnection I/O circuit generates an output DC voltage to signify a logic level 1, an output ground to signify a logic level 0, and a floating output to signify that the microcontroller has not determined the presence of a first hazardous condition.

18. The detector of claim 17, wherein the I/O circuit generates output voltage pulses of between approximately 25-50 milliseconds every 100 milliseconds to signify a logic level 1, and maintains a ground to signify a logic level 0.

19. The detector of claim 15, further comprising a smoke detector circuit coupled to the microcontroller; and

wherein the microcontroller determines the presence of smoke alarm condition based on input from the smoke detector circuit, the microcontroller commanding the interconnection I/O circuit to generate a constant DC output to alert external devices of the smoke condition.

20. A distributed hazardous condition detection and alarm system, comprising:

a first hazardous condition detector;

a second hazardous condition detector; and

a 3-wire interconnect coupling said first detector to said second detector, and

wherein at least one of said first and said second detectors is operable to generate a multi-bit alarm message on the interconnect to indicate the detection of a first hazardous condition, and wherein at least one of said first and said second detectors is operable to generate a constant DC level on the interconnect to indicate the detection of a second hazardous condition.